



THE STORY OF SOVIET ARMOR

PART III - THE WAR YEARS - THE TANK

by GARRETT UNDERHILL

What happened in 1941, when Hitler pitted 4,100 tanks against Stalin's 21,000 to 24,000?

What was the effect on Hitler's drive into Russia, when—because of the inexcusable inability of the Wehrmacht to exploit open sources of intelligence—weakly armed and armored light and medium German tanks were surprised by revolutionary-type big-gunned Soviet heavyweight mediums and 52-ton heavies?

What did Hitler's panzers do for air cover, when Goering blandly assigned units with a T/O strength of about 1,280 combat planes—to buck Soviet air fleets incorporating 4-engine bombers (which the Germans didn't have), and totalling at least ten times the Germans' combat aircraft?

What navy support could German blitz forces expect on their Baltic Sea flank, when Stalin had a submarine strength of approximately 226 boats—some built in Leningrad under supervision of German engineers during the 1930s, others turned out under the aegis of the people whom many then thought to be the world's best sub designers and builders, the fine Italian hands of the Adriatico firm's engineers?

THE answers to these questions may have a vital bearing on present-day American policy. Recent widely featured newspaper and magazine reports—some implying that they have been "inspired" by sources within the Government, who have access to official intelligence—have clearly attempted to influence public and official opinion by bearing down upon the estimated quantitative superiority of the Soviet armed forces. A very widely syndicated column, pretending to give the figures with which Lt. Gen. Gruenther briefed Congressional leaders on behalf of the Joint Chiefs of Staff, has given Stalin's 1950 tank strength as 40,000—as against 7,000 for America. This 40,000 figure has also been relayed to the public by a national magazine which is reputed to reach an audience of 20 million people—and the mailbox of just about every national legislator. Much is made of the fact that the West has only "obsolete" armor, while the Reds have "the best heavy tank in the world"—the Joseph Stalin III.

... VERBIS ...

Other statistics list 1950 Red air fleets of 17,000 to 19,000 planes (including 300-350 4-engined bombers) to oppose an American air strength of 13,000—or 8,800 combat US Air Force and Navy planes (depending on which figures you take, and how you wish to define your terms). Officially sanctioned statistics give the Soviet Navy 270 undersea craft.

Since any force is of necessity the prisoner of its own history (and especially of its immediate past), any survey of the war years of Soviet armor should tell us a great deal about what we have to worry about concerning the Soviet forces today. Should we blindly assume that the Russians are Americans—that their technical, administrative, managerial skills are on a par with ours; that the Soviet system, based on centuries of Russian autocracy, can breed individual initiative even to the degree achieved in dictator-controlled but nevertheless basically bourgeois capitalist states, like Germany?

Should we take fright from mere numerical strength—and try to impoverish ourselves to match it? Or can we find, by intensive study and analysis, that the American way—

militarily developed—can be vastly superior to the Russian way, just as it is in civil life? Should we concentrate upon quality, upon ideas, upon our self-evident superiority in the human factor? We certainly ought to discover, by delving into immediate war history, whether that dread do-it-or-else doctrine that for a generation has ruled Russia, is able normally to breed minds as fit for vitally needed initiative in modern mobile war—as can the American way.

If anything can, a study of the war years should give us some reasonable idea of whether to continue to be fascinated with mere material strength—doubtless a legacy from our effort to create the World War II "Arsenal of Democracy", or whether to devote more effort to the development of

The Story of Soviet Armor has been running in The Journal as a staggered series. The "Early Days" appeared in the issue of January-February, 1949. The "Middle Ages" (the 1930s) appeared in the issue of May-June, 1949. A complementing article titled Backlight on Soviet Armor appeared in the November-December issue of The Journal, and covered Russian war industry through the ages. With this issue we begin publication of the "War Years." This part of the series will in turn be divided into sections on tanks, Sfs, tactics and people. The first of two parts on the tank appears here, and will be completed in the issue of May-June. It is our hope that the series can be rounded out with a coverage of armored cars and armored trains.

—The Editors.

new concepts, new techniques, more field combat skills—and a way to convert our incalculable reserve of specialized civil skills and talent with a minimum of training.

The way in which the Joseph Stalin III heavy tank is featured in official and press discussions of Red power, is ample indication that the story of Soviet armor can indicate that a violent reorientation of American thought is highly necessary. For just being "discovered" by Americans in 1950 is the "best heavy tank in the world"—the JS III.

Actually, the JS III is obsolescent. It appeared in battle in Poland in 1945. It is the fifth edition of a heavy tank which first appeared in 1940. Original design of that basic Soviet tank was worked out in Kremlin conferences with Stalin himself as early

as 1938. The original tank, and the whole line of subsequent development, is revealed not just as the story of technical development. It's a vast and complex panorama involving Red inferiority complexes toward foreign power, the tendency of Stalin to interfere ruthlessly in minor armament matters, personalities within Soviet ordnance, the effect of Soviet official preoccupation with numbers rather than with quality, and the effect of resultant industrial efficiency upon the trinity of technical weapons characteristics, the ability of available manpower, and strategic and tactical concepts.

Originations or Imitations?

In Part I of THE STORY OF SOVIET ARMOR (ARMORED CAVALRY JOURNAL, Jan-Feb., 1949), efforts of Soviet engineers of the 1920s to originate their own tank designs were outlined. As patriotic Russians and as men representative of a new political faith, they hardly wanted to be "slavish imitators" of the Western "capitalist" military and their industries. But however much an inferiority complex might cause them to strive to pioneer and try out the new, they lacked that element which (as was indicated in BACKLIGHT ON SOVIET ARMOR, (ARMORED CAVALRY JOURNAL, Nov-Dec., 1949) autocracy-controlled Russian industry has lacked since Moscow's Grand Prince Vasil Vasilievitch first imported Italian artisans to make cannon in the 1400's. That element was practical know-how.

Part II (ARMORED CAVALRY JOURNAL, May-June, 1949) described how around 1930 the Soviet engineers reluctantly accepted basic tank chassis of foreign firms—and managed to produce them not only in great quantity, but also to make important modifications causing Russian tanks to rate as tops in the Spanish Civil War of 1936-39. It mentioned that, towards the end of the third phase of Soviet armor development, the Soviet engineers at last felt able to turn out their own designs: to capture that world leadership in tanks which had ever been their objective.

These designs were actually started before the returns from most of the "proving ground wars" were in. The Spanish Civil War, Russia's two brushes with the Jap Kwantung



A Russian T-34/85 of the Dmitri Donsker Brigade.

Army, Russia's occupation of Poland in '39 (and her 1940 occupation of Rumania's Bessarabia province, and of the Baltic States), appear to have had slight effect upon the designs which were presented by Soviet tank engineers in the critical 1938 meetings in the Kremlin itself—in Stalin's own office.

Chief of State—and Ordnance

It seems that Stalin himself, like Hitler at a later date, had by this time assumed in effect a dictatorial role as sort of Soviet chief of ordnance. He seems to have had a two-way influence on Soviet armor—good and bad. The good effect seems to have been expressed in the power of absolutism to make engineers find the formula for the impossible. Stalin is stated to have demanded not superiority in fire power and armor (such as in France's tanks of the late 1930s), or designs giving speed and mobility at the expense of armor and guns (like British and American tanks of the 1930s period). Stalin demanded that the new Soviet line of tanks be outstanding in guns, armor, and speed. Besides being tops in the chief trinity of tank characteristics they were to have superior mobility (to get around difficult terrain), range sufficient for proper long-range employment of armored units, and to be proof against flash fires from gasoline-type fuels.

The all-powerful chief of the Soviet state in effect demanded a revolution in tank design—which would

nevertheless enhance, not hinder, armor's "produceability."

He got it—in the now famous pair, the KV heavy tank and the T-34 medium tank. As one Soviet author has put it, Stalin urged his military "to face reality, and not lock [themselves] in shells of ossified dogma."

Apparently the Soviet engineers and the tactical specialists were not planning those "abrupt and drastic" changes which are said to have come out of the Stalin conferences. The engineers of the Kirov factory in Leningrad (the old Putilov plant) had worked out several test models of new heavy tanks, the blueprints and scale models of which they brought with them to the Kremlin. Like the T-35 heavy tank (which grew out of Britain's Vickers Independents of 1926), these had three turrets for cannon, and were fitted with machine guns to cover various angles.

The story has it that Stalin, dissatisfied, paced up and down. He took off one turret from a tank model, asked: "How much weight did I remove?"

"Three tons," was the answer.

"Use that weight to increase the armor," ordered the Great Dictator. "I don't see any advantage in multiple gun turrets."

At this point there seems to have occurred a smart, slick maneuver by the Kirov design department headed by the now-famous Hero of Socialist Labor, Maj. Gen. (by our tank system) J. Y. Kotin. In what may have

been an offside play like the snake's suggesting eating the apple to Eve, Kotin remarked to Stalin that he happened to have a design at hand with plenty of armor, and only one turret. Stalin is said at once to have been interested. According to Kotin's bootlicking story, Stalin—inspired apparently by Kotin's suggestion—proposed a third design with a single big-gunned turret and still heavier armor than Kotin had specified. The meeting ended with Stalin ordering prototypes both of the multi-turreted model he'd modified, and the heavy suggested by Kotin and ostensibly improved by the Sphinx of the Kremlin.

"In a short time" both models of heavy tank were built—and the Kremlin revisited. As could have been expected, the Kotin-Stalin heavy was selected, and named the "KV," for Stalin's old Civil War crony and Defense Commissar Klementi Voroshilov.

Stalin fussed about the suspension; he didn't like the armored skirting used to protect it, felt it did little good, and yet its weight subtracted from armor protection on the main body of the vehicles. The military—perhaps only the design engineers—held out for the skirting (they'd used it on the older T-28 medium and T-35 heavy). The meeting ended with Stalin's demand for a new-type suspension.

Torsion Bar Suspension

The solution was the torsion-bar mount for bogies. By this time this simple sort of mounting had appeared (in 1932) on the German Dr. Ferdinand Porsche's famous racing cars. Dr. Porsche, close to Hitler, had pushed it for the most successful German medium tank—the Pz.Kpfw. III, which by the end of 1938 was showing off tank torsion bars in public, after going through a variety of unsatisfactory suspensions. According to the Russians, the KV with its broad 28-in. tracks could continue to move with one or more of its bogies out of action—thus providing it with protection by design, rather than by armor alone. It is significant that, at this time, Americans considered torsion bar suspension impractical because insufficiently developed.

Apparently the decision was made to put the KV heavy tank into pro-

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duction before the suspension question had fully been worked out. Soviet sources give 1939 as the year the Kirov works began production; KVs are credited with being instrumental in the final drive which broke the Finnish Mannerheim Line, in February and March of 1940.

Substantiation of the Soviet accounts is afforded by Finnish capture of a heavy tank, usually incorrectly identified as a T-35 C. Clearly, this monster is one of the KV experimental models of which the Soviet armor historians write. It seems to be the one from which Stalin removed one of the three turrets—for it has a front 45mm gun turret, a high center turret with a 76mm gun. There's no 45mm turret in the rear, where one might be expected in a tank following the 1920s ideas about "independent" tanks, capable of breaking through and going on their own as rolling forts—with gun protection furnished all angles.

Gun Protection

The idea of a light antitank-type gun to "protect" medium-caliber weapons was preserved in France in the Char B's of the late 1930s, and in the American M3 Medium, which closely aped the French Char B. With characteristics laid down in June of 1940, this M3 Medium or General Grant had its 75 down in the front right of the hull—not high in a central position as in the Russian heavies and mediums of the 1930s. The 37-mm, smaller of course than the Char B's 47mm or the Russian 45mm, was high in a central turret.

This Soviet experimental tank, as captured in Finland, had eight bogies a side to the final KV's six. Uncertain German intelligence has given the length as a fantastic 32 feet. Very possibly the Finns never got a chance to get a good look at this tank—if it happened to be one which made an abortive Mannerheim Line breakthrough, and was soon recaptured by a more successful Russian attack. Anyhow, it is outwardly the same as a tank which appears briefly in the Soviet propaganda film on the Finnish War, which the Reds distributed to the West later in 1940.

The Soviets confess that it was the Finnish War which really taught them about armor in modern war. They noted that heavy tanks were



Marshal Klementi Voroshilov, whose initials designate KV tank.

"fairly successful" when engaging wood, earth, and stone fortifications with powerful armament. They were made armor-conscious by observing how modern artillery of all categories can be effective in antitank roles. It was only in Finland that they recognized the lesson the world had drawn from Spain (where Russian 45mm antitank guns had been the prime teachers): that tin-plate tankettes and light tanks, with no more than .16- to .7-in. armor, were no go against antitank weapons in standard service throughout the world. Soviet armor historians also remark that the Red Army found that

bulk was an advantage in tanks, because it afforded protection to accompanying infantry.

While the old T-28 medium tanks used against Finland certainly had bulk, none of the new series of tanks had. In these Soviet design followed German suit, putting great stress upon the protection afforded by keeping even big tanks squat. Low silhouette was also thought to make for easier concealment, making for better chances at surprise (especially in ambushes). In this respect the Soviets and Germans thought alike—though the Soviets do not appear to have created tanks that were quiet runners. (The Diesels of the standard Soviet armored vehicles of the new line, smoked profusely—and still do—on starting; this seems a characteristic which hardly enhances concealment for surprise effect.)

The Finnish War may actually have brought home to the Soviets the above lessons, but it did so too late to change plans for their new line of tanks. For it will be noted that the little 5½-ton reconnaissance tank, the amphibious T-40, was armor-wise to be listed in the tin-plate armor category made obsolete by "proving-ground war" lessons. Yet this tank did not appear in service till after the KV and the medium T-34.

The main modification made at this time to the KV seems to have been the introduction of a more powerful 76mm gun—the M1940, which was also fitted to the T-34 medium. In



German troops examine a KV-2 tank against which their 37mm fire apparently had only scarring effect.

1941, just before the war, Stalin is said to have demanded a great increase in armor on the KV—double the thickness, without decrease in combat effectiveness in other characteristics. The design engineers opposed his suggestion, but a child can guess who wins an argument with Stalin when the onetime theological student has his mind made up. The result very apparently was the lot of 48-ton KV's which the Germans arbitrarily listed as the KV 1 B. These KV's had plates 1- to 1.37-in. thick welded to front and sides of the hull. Crudely bolted to the side of the turret plates were extra plates of similar thickness. The way the extra turret plates were attached suggests that the original armor structure was weakened. The thickness of plates on all the reinforced tanks the Germans captured indicates that Stalin did not get his way, for the standard armoring on hull and turret of the original KV was a millimeter short of 3-inches (75mm).

The Soviets do not appear to be very proud of this hasty improvisation, for pictures of it from Soviet sources are scarce. The additional armor was an emergency measure taken before the German 88's had distinguished themselves by shooting up heavily armored British Matilda infantry-accompanying tanks around Salum, in Egypt, on 15 June 1941—which was only a week before the German invasion of Russia.

Generous Tolerances

(Slide-rule enthusiasts with a passion for close tolerances are often confused by the widely varying thicknesses of armor given by those who have actually gaged armor thicknesses on different specimens of the same model of Soviet tank. It's apparent that the Soviets speed production by allowing armor manufacturers generous tolerances, so long as they do not go below a minimum. Despite metals shortages, wartime production allowed even wider variance. Naturally, castings vary more than plate. Hence, any definitive armor specifications for Soviet vehicles—if not stated as the Soviet G1 line—are more or less arbitrary.)

The original KV (called by the Russians the KV, or KV-1; by the Germans, the KV I) probably was much affected by a strong autocratic



KV's being factory serviced at Kirov Works in Leningrad, prior to evacuation. Note plate and cast turrets.

character like Stalin's. Compared to the hulking monstrosities like the T-35's and the Mannerheim Line tank, it represented a concentration of power and protection seemingly largely effected by a ruthless reduction in size of hull and turrets. The design certainly gave a far more efficient combat vehicle for the amount of steel and industrial effort. Weighing in at 46 tons, it managed to mount a more powerful gun than the German Pz.Kpfw. IV tank of 1941, (a 76mm M1938/39 30.5, then 41.5 calibers long, as against the German 75 of 24 calibers).

Defensively, the KV was also a most important jump ahead of the Germans. It had welded plate armor on hull and turret that was proof against anything up to 75mm anti-tank guns at all ranges (in the Russian estimate). The German Army was just issuing its new 50mm Pak 38 in 1941; the 75mm Pak 40 didn't appear till the next year. That meant the KV's at first had only the 88's to fear—and even these often had a rough time of it.

What was perhaps more remarkable was this heavy's mobility, and what the Russians call "passability." During the war the point was often made in America that heavy tanks were less "mobile" than the mediums; the impression got around that the mediums could go where the heavier tanks couldn't. In their simple way the Red ex-peasant/military, aided

by trained Russian minds adept at theorizing soundly and with originality, figured out that a vehicle gets around because it has power, and because it's light on its feet.

The Russians, who previously had tended to take tracks in more or less the sizes used on the foreign vehicles they copied, now became very ground-pressure conscious. They led even the Germans. Pioneering in the field with the new line of tanks, they particularly distinguished themselves with the 28-inch wide tracks of the KV, which on a short length gave a ground pressure even on the KV 1 c (see below) of only 10.4 lbs. per sq. in. Our "mobile" M4A3 Sherman, weighing 20 tons less, rated at 12.5 lbs. The Russians claim that the KV could make 24 miles an hour, but it could make good a top of 21½—and do 20 cross-country. US tests with a new one kindly lent proved that in 1942 it could negotiate worse terrain than US tanks and TD's then extant—though it was bad in sand.

As evidence of over-all Russian efforts at ruthless standardization for production, the KV used the same Diesel as the medium T-34 of the new tank line. This V-2 was the outgrowth of a great Russian effort to get a proper tank engine, for engineers had been dissatisfied even with the 500 HP M-17 aviation-type engine developed to succeed the US Liberty. It is noteworthy, however, that the V-2, which began to come into service around 1940, was basically rated at 500 HP, like the earlier gasoline engine which it replaced. Thus, while doubling the radius of the vehicles to which the new Diesel was fitted (according to Soviet claims), and reducing the fire hazard (they still burned, though), the V-2 did not represent a Soviet effort to keep ahead of the game in horsepower.

Power Plants

However, the Soviets deserve full credit for pioneering in this field. The Germans, Diesel experts though they were, never perfected a standard powerful tank Diesel fit for service use; neither did the US—which had to resort to the unsatisfactory expedient of coupling auto engines to get 500 HP units for our principal armored vehicles. The Soviets thus accomplished in this 60-degree "vee"

12-cylinder liquid-cooled engine what the West could not, because the West hadn't prior to the war the time and money to perfect such a war tool. The Soviets did take time—and achieved at the special Kharkov Diesel plant something remarkable for Soviet Russia: an automotive development that wasn't adapted from some well-proven foreign design. (But a similar effort to develop a powerful aviation Diesel failed; it would seem that the engine worked out well enough for tanks, but not for planes.)

Soviet accounts don't usually mention one of the main reasons why they want Diesels: because of gasoline shortages, and the poor quality of the gas that is refined. In the Five Year Plan interrupted by the war, trucks and tractors were to be increasingly Dieselize, too.

To give the KV as much power as possible, the V-2 was fitted with bigger fuel pumps and injectors than used on the T-34. At 2,000 r.p.m., the V-2 was then able to deliver 600 HP. This nevertheless gave a rather low horsepower-weight ratio on the KV 1 c of 11.5 HP per ton, and meant that the consequent specified average road speed of 12½ to 15½ mph was really too low to work in company with the medium T-34. The medium could make 15½ to 18.7 on the average, according to the Red book.

KV Fittings

Although the 1930 series tanks had gone in for driver's episcopes and turret rotatable periscopes, the KV was even more luxuriantly fitted with vision devices. The turret had the usual two roof periscopes in front, plus an episcopes on each side and over the rear. The standard DT 7.62-mm machine gun was mounted in a ball mount in the turret rear plate, while a pistol port guarded each side of the turret. There was a ball mounted DT to the driver's left, and an episcopes for him—though he also had a port pierced in the plate in front of him, closed by an armor wedge. The tank had a five-man crew, and special tank radio sending and receiving radio.

Possibly also a fruit of Stalin's demand for extra armor were the KV 1 c's. The beefing-up of hull armor on this modification was a slick factory job. There was the extra frontal

armor of the KV 1 b, but the basic side armor was upped to 3½ inches, in some places increased to 5.1 by an extra plate. The great feature of this tank was its cast turret, which not only gave a good ballistic shape for shedding projectiles, but also strengthened the turret base. Armor casting, which the Germans at this time did not go in for, had been under study for some years in Russia—like the tank Diesel. It is interesting that the then current West Point ordnance text (Hayes', of 1939) noted that armor castings were not yet practical—though the French were using them late in the 1930s. This KV 1 c mounted the M1940 76mm gun of 41.5 calibers, which was slightly more powerful than the 75 which appeared in 1942 in the M4 Shermans (2,200 foot seconds muzzle velocity vs. 2,030, with AP round). The Germans didn't catch up till their second season in Russia, when they put into the field their Pz. Kpfw. IV's with long (43 cal.) 75mm Kw.K. 40's.

A variant of the KV was the KV 2, hailed as very effective against the Finns' Mannerheim Line. It was a monster on a KV chassis, having a high turret weighing 12 tons and mounting a 152mm howitzer M1938 (or 1938/40) 20 calibers long. Also built but not discussed in material so far available, was a KV 2 armed with an 85mm tank version of the M1939 antiaircraft gun—the piece which later rearmored the KV and now arms the current T-34s. This gun hints at plans to use KV 2's as tank destroyers, a mission for which, their skyscraper silhouettes hardly fitted them.

Kotin seems to have got quite a nice little power package into his KV, if its dimensions are compared with that of a US M4A2:

	Height	Length	Width
KV	8.9 ft.	21.8 ft.	11 ft.
M4	9.7 ft.	19.4 ft.	8.3 ft.

It can be seen at once that Kotin, thanks to the outside gage of Russian railways, made the most of the over 2½ ft. width advantage he had over US designers. On account of power limitations, he couldn't build up to the weight limits of the railways—which were 60 metric (66 US) tons for bridges. His railway width clearance was 10' 11".

If the KV heavy was a remarkable

tank for its day, its mate—the T-34 medium—was more so. Outside of recounting that its design was produced in 1938 by the Komintern Plant's engineers, headed by A. A. Morozov, the Soviets are silent on its early history. Nevertheless, it is the tank which certainly betrayed design genius. It was the first to make full use of the principle that well-sloped armor adds greatly to its effectiveness. The front plate sloped at 60 degrees up over the driver, but was pierced on the left with the driver's hatch (fitted with periscopes) and on the right for a ball mount DT machine gun. The sides of the superstructure sloped at 41 degrees, the rear at 49 degrees. The armor was 1.8 inches thick—though 'original' models had sides and rear a quarter inch thinner. The turret was shaped with sloping sides, but had a rectangular rear mounting a DT machine gun. The side plates dovetailed with the front. Cast turrets were fitted to the T-34 at about the same time as to the KV's. Turret armor was also 1.8 inches. Unfortunately, the turret had a rear overhang, leaving only a slit between the hull top and turret bottom. Into this slit the Germans found it convenient to slip teller mines (standard AT mines) or demolition charges. One such would blow the turret off—and did, despite a DT machine gun in the turret rear, and an episcopes and pistol port on each side. Two rotatable roof periscopes were fitted. As late as 1941, some T-34s had the M-17 gasoline engine.

About the same time as the KV got a cast turret, the T-34 got one too. The change brought about some slight armor increases; the hull front increasing to 2-inches, and the turret to what must have been a minimum of 2-in. on the sides. However, this slight increase may only have been due to different procedures by different factories.

The 76mm M1940 gun fitted was slightly more powerful than the US 75. At first it appeared only in unit commanders' tanks, later wholly replaced the M1939 of 30.5 calibers. The armor on the US tank was about the same in thickness—though vertical on the sides (although there can be no doubt that US plate was always far better in quality).

The T-34 with cast turret compares interestingly with the US M4A3

Medium: designed in 1941, and appearing in 1942:

	T-34	M4A3
Combat weight	32 tons	32 tons
Width track	20-in.	16-in
Ground pressure	10 lbs per sq in	13.6 lbs
HP	500 at 1,800 rpm	500 at 2,600 rpm
Engine	Diesel	Gasoline
Road speed (Max)	32 mph (Russian: 29.4)	28 mph
Height Over all	7.9 ft.	9.3 ft.

The T-34 had remarkable mobility. Its power combined with broad tracks was most useful in fall and spring muds, and after summer rains had made the Ukraine fields quagmires. The T-34 was designed to negotiate snow 3 feet deep and so got on well in winter. (In Task Force Frigid exercises in February 1947, US heavy (now medium) Pershing tanks were overheating engines laboring through 30 inches of light snow.) Its version of the V-2 Diesel gave it a 15.6 mph road speed, according to the Russians, and burned $\frac{1}{4}$ s of a gallon of fuel a mile going cross country or along bad roads. (Since most Russian roads are bad, this means in effect standard consumption.) Its dimensions were (outside those given) 19 ft. 4-in. long and 9.82 ft. wide—showing that Morosov, too, had width to play with to gain form and power. He managed to pack 77 rounds of 76mm ammo in the hull, plus 46 drums for the DT's.

A Great Impression

With its speed, mobility, gun power—and particularly the form of the hull—the T-34 made a great impression on the Germans. It completely outclassed their tanks, and resulted in the Panther 50-ton medium of 1943—whose form was obviously borrowed from Morosov's conceptions. When the Germans began to be impressed with the Sherman's qualities, they could think of no better compliment than to dub it "the T-34 of the West."

The T-34 was not a perfect tank. It was hard to drive on hard roads; its Christie fast suspension, inherited from the BT's, gave a rolling and unstable platform when going cross-country. It was of course most uncomfortable, but comfort is the thing Soviet tanks are made to do without. Transmissions do not appear to have

been very reliable even when the Germans attacked, for there are

photos of T-34s with spare transmissions secured by cables atop the rear. The original crew was 4, or sufficient for the mission of an armored force medium tank.

It is horrifying to consider that, when the 46-ton heavy KV and the 30-ton (original weight) T-34 were going into production in 1939, the US was procuring a 10-ton M-3 Light for its only "armored force" (the Mechanized Cavalry), and an 18-ton "medium"—both of which were armed with 37mm guns. Both had riveted armor and open slits for vision in combat. When the Germans went into Russia, they attacked with the 21-ton Pz.Kpfw. III (37mm or short 50mm) as their main medium, supported by 23-ton IV's with short 75's with 11-ton light II's with 20mm automatic cannon to fill out. The Germans learned fast, though. The Tiger—which appeared first on Lake Ladoga in November, 1942, Panther, and Royal Tiger were the direct results of the first meetings with the Russian wonder tanks.

When and Where?

Contrary to wrong Western ideas and Soviet fable, these tanks were encountered almost at once when the Germans attacked on 22 June 1941. Photos taken by the Germans and wired to America show that T-34s were picked up in Grodno, in Russian-occupied Poland. A mess of T-34s were overrun in Kaunas, the former Lithuanian capital, only some 300 miles from the Eastern Prussian border. The first German photo of a captured KV reached the US within a week of Hitler's assault on Russia. The strange thing is that in June and July the Germans on all fronts seemed to meet more KV-2's with their tower turrets, than KV-1's. But they ran into lots of KV-1's around Leningrad in

October when closing in on the city—for Leningrad's Kirov Plant was where KV's came from.

There is utterly no truth in the Soviet story about T-34s turning the tide of the Moscow battle, because they first appeared in that fight. This myth must be an attempt to make people forget—if they ever knew—that the new Soviet tank types, however revolutionary, and however much a headache for German armor and antitank, did not apparently have any effect on the German advance.

No Late Dope

That the Germans were not seriously affected is remarkable. The troops didn't know that any such vehicles existed as the KV's and T-34: there was nothing on them in the handbooks. But there should have been—had the Germans had good observers with the Finns, or good ways of getting dope from that front. There they would have picked up the KV's—or the KV-2 anyway. As for the T-34, it was exhibited to the American photographer Margaret Bourke-White at the Stalin Tank School near Moscow in May of 1941, on which occasion plenty of pictures were taken for Life.

Pictures were also taken then of the T-40 light amphibious tank—the last of its line, and the one which showed that the Soviets missed the lessons of the Spanish Civil War. This was being issued to units in 1940, like the companion KV's and T-34s. It weighed only 5½ tons, and had too light armor: .6-inch on the front and only a paltry .4-in. on the sides. It had flotation tanks, a four-blade water propeller, twin rudders, a motor to the right of its hull and the turret to the left. The turret mounted a 12.7mm D.Sh.K. machine gun (like the Army-Navy antiaircraft one) and a coaxial DT of 7.62-mm (in other words, a .50 and a .30, like our contemporary Cavalry Combat Cars of twice the weight and armor). It could make 27½ mph on land, and 4 in the water. The crew was only two. In 1941 when the tank saw service few if any radios were fitted, so the problem of how properly to use the tin can in its battle recon mission could never properly have been worked out.

(To be continued)

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